Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Streamlining Licensing Procedures for Small Satellites	)	IB Docket No. 18-86
	)	
	)	

COMMENTS OF ECHOSTAR SATELLITE OPERATING CORPORATION AND HUGHES NETWORK SYSTEMS, LLC

I. INTRODUCTION

EchoStar Satellite Operating Corporation ("ESOC") and Hughes Network Systems, LLC ("Hughes") (together with their affiliates, "EchoStar") submit these comments in the above-captioned proceeding to consider proposed rule revisions to facilitate deployment of small satellites.[1]

By virtue of its long-established position as a U.S. satellite operator and technology manufacturer, EchoStar is particularly well-suited to provide comments in this proceeding. ESOC is the nation's largest commercial geostationary orbit satellite operator and provides broadcast, fixed and mobile services. Hughes is the leading provider of satellite consumer broadband services with over one million hard-to-reach subscribers in North America. Since launching JUPITER II, its new satellite providing broadband service at speeds of over 25 Mbps down and 3 Mbps up for residential customers, and 55 Mbps down and 5 Mbps up for enterprise

[1] *Streamlining Licensing Procedures for Small Satellites,* Notice of Proposed Rulemaking, FCC 18-44 (Apr. 17, 2018) ("*Small Sat NPRM*").

users, almost half of Hughes' 1.2 million satellite broadband customers have migrated to the new service.[2]

Additionally, Hughes' next-generation JUPITER III satellite is already under construction at Space Systems Loral in California, and is planned for launch in late 2020. JUPITER III, the first-of-its kind ultra-high density satellite, is designed to provide two-way internet service at even higher speeds of up to an estimated 100 Mbps down and 10 Mbps up using the Ka, Q, and V-bands delivering expanded service millions of households throughout the United States.

Hughes is also a technology manufacturer. In addition to developing its own innovative satellite broadband network, Hughes manufactures ground network systems for other satellite providers in the industry. For example, Hughes is building out OneWeb's ground infrastructure, including gateways and user terminals, to support OneWeb's constellation of Low Earth Orbit (LEO) satellites in its mission to bring affordable broadband service to millions of households, schools and other end users around the world.[3] The joint development of the ground network began in 2015 and shipments began in March 2018.[4]

Overall, EchoStar supports the Commission's proposal to streamline application processing for small satellites. Specifically, the Commission should adopt rules to limit the number and types of small satellites eligible for such streamlined processing. To protect incumbent satellites operations, the Commission should adopt suitable technical and service

[2] Comments of ESOC and Hughes, WC Docket No. 18-89, at 2 (June 1, 2018).

[3] Press Release, Hughes, *Hughes Signs $190M Contract with OneWeb for Production of Ground Network System for Global Internet Services* (Nov. 7, 2017), https://www.hughes.com/who-we-are/resources/press-releases/hughes-signs-190m-contract-oneweb-production-ground-network.

[4] Press Release, Hughes, *Hughes Ships First Gateways for the Ground Network to Support OneWeb's Low Earth Orbit Constellation* (Mar. 13, 2018), https://www.hughes.com/who-we-are/resources/press-releases/hughes-ships-first-gateways-ground-network-support-onewebs-low.

rules, including requiring small satellites to operate on a secondary, non-interference basis with respect to other satellite operations when the small satellite operations are consistent with existing frequency allocations in the International Table of Frequency Allocations. To further avoid interference with incumbent satellite operations, inter-satellite links ("ISLs") should only be permitted to operate in frequency bands specifically allocated for space-to-space operations, not in bands allocated for uplink or downlink satellite service operations. To ensure the safety of space for all space operations, small satellites should be required to adhere to principles of orbital debris mitigation and space traffic management. Finally, EchoStar encourages the Commission to review the application fee it sets for the small satellite streamlined application one year after adoption to determine if the fee adequately encompasses the resources expended by the Commission to review each application.

II. THE COMMISSION SHOULD LIMIT THE NUMBER AND TYPES OF SMALL SATELLITES ELIGIBLE FOR STREAMLINED PROCESSING

EchoStar supports the Commission's proposal to adopt a streamlined application procedure for small satellites that comply with specific technical and application requirements. The Commission seeks comment on the operational characteristics of the small satellites, including imposing a limit on the number and size of the satellites, requiring the small satellite operators to assess operational debris and collision risk, and the trackability of small satellites deployed.

Number of Satellites and Spacecraft Size. EchoStar supports the Commission's proposal to limit the size of the small satellite constellations eligible for streamlined processing to 10 satellites per system.[5] Similarly, the Commission should adopt its proposal to require that the

[5] *Small Sat NPRM* ¶ 27.

small satellites be limited to 180 kg in size.[6] These limitations would ensure that the small satellite constellations eligible for streamlined processing are least likely to interfere with other Part 25 licensed satellite systems.

Orbital Debris and Collision Risk. With the number of space objects orbiting the earth expected to significantly increase in the coming years, small satellite operators must adhere to a set of orbital debris and space traffic management principles in order to preserve space for current and future operations. These principles include space situational awareness, collision avoidance, trackability, and orbital debris mitigation.

Small satellites that are eligible for streamlined processing must be designed to minimize the risk of collision throughout the satellite's lifetime and at the end-of life. The applicant should assess the risk of collision between its satellites and those of other constellations as well as other space objects and mitigate those risks through satellite design, and provide relevant information to the Commission. The spacecraft must also be designed in a way that prevents accidental explosions and breakup of the spacecraft over the long term.

EchoStar supports the Commission's proposal to require certification that the small satellites will release no operational debris in a planned manner during their mission lifetime.[7] Further, the Commission should require applicants to certify that the risk of collision with large objects is less than 0.001. This certification is necessary along with the other eligibility criteria proposed by the Commission in order to preserve an orderly and safe space operations environment. Requiring such certification requirements imposes few administrative burdens which are more than outweighed by the greater certainty to the Commission and other satellite

[6] *Id.* ¶ 32.

[7] *Id.* ¶ 35.

operators that the risk of collision posed by these small satellites has been adequately addressed and minimized.

Trackability. All small satellites regulated by the Commission should be designed to be trackable from the ground by active means. EchoStar supports the Commission's proposal to require all small satellites to be large enough to be effectively tracked in order to qualify for streamlined application processing.[8] The applicant should be required to certify that the small satellites incorporate design characteristics to ensure the satellite's trackability, such as adding laser retroreflectors to each space object. When a satellite is trackable, proper action can be taken by satellite operators in the event that a conjunction warning involving an active satellite is received.

III. THE COMMISSION SHOULD APPLY EXISTING RULES AND ADOPT ADDITIONAL RULES TO PROTECT INCUMBENT SATELLITE OPERATIONS

Existing Part 25 Technical Limits. It is imperative that the small satellite systems meet the existing technical standards set in Part 25 of the Commission's rules. Adherence to the existing technical rules will ensure that the small satellites will operate safely, in compliance with international rules, and avoid interfering with other satellite operations.

Frequency Band Allocations. The Commission should adopt rules that ensure that the operations of the small satellites eligible for streamlined processing do not interfere with the operations of GSO satellites or non-geostationary orbit (NGSO) systems operating in the Fixed Satellite Service (FSS).[9] While the frequency bands for small satellites are yet to be determined, the Commission should require that to the extent that small satellites are permitted to operate in

[8] *Id.* ¶ 38.

[9] EchoStar does not seek to comment on the uplink or downlink operations of small satellites in the Mobile Satellite Service (MSS).

frequency bands allocated for FSS operations, that they are required to operate on a secondary, non-interference basis with respect to other satellite operations. So long as small satellite operators are required to operate on a secondary, non-harmful interference basis, EchoStar does not object the Commission permitting operations in the frequency bands listed in section 25.202 of the Commission's rules.[10]

Permitting small satellite constellations to operate in this manner will provide the small satellite operators with sufficient access to spectrum while ensuring interference protection for satellite operators authorized to operate in a particular frequency band. In addition, the Commission should require that small satellites incorporate certain design elements to protect the operations of FSS satellites. Specifically, small satellites and their earth stations should be designed to operate within the power levels specified in Part 25.

Inter-Satellite Links. In response to the Commission's request for comments on the regulation of inter-satellite links ("ISLs"), EchoStar urges the Commission to permit ISL operations only to the extent that they are consistent with International Telecommunication Union (ITU) Radio Regulations. The Commission should not permit ISLs to operate in spectrum that is not allocated for Inter-Satellite Service (ISS) use. There are already a number of frequency bands specifically allocated for ISLs in the International and U.S. Table of Frequency Allocations that are available for such use. Any ISLs contemplated by small satellite operators should be limited to those frequency bands specifically allocated for such use.

The Commission's interpretation of space-to-space operations should continue to apply for small satellites and other satellite operations. When FSS operations are limited by parenthetical to operations in a particular direction, such as space-to-Earth, inter-satellite

[10] 47 CFR § 25.202.

communications are not in accordance with the Table of Allocations. Rather, the operations of ISLs are in accordance with the Table of Frequency Allocations only where a parenthetical to a FSS allocation specifies "space-to-space" communications.[11]

In addition, ISL operations should be permitted only in those frequency bands in which the ITU has specifically allocated for "space-to-space" operations. Permitting ISL operations between GSO and NGSO satellites, including small satellites, in other frequency bands that are allocated for "space-to-Earth" or "Earth-to-space" operations (but not space-to-space) is inconsistent with the Commission's rules.[12] Furthermore, these ISL operations have not been studied by the ITU to properly assess the interference threat posed by the small satellites to GSO operations. As such, until the relevant technical studies have been conducted and it is shown that there is no risk of harmful interference to the services that the bands are allocated, the Commission should not allow use of such bands for "space-to-space" operations.

Finally, the Commission should not revise the existing definitions of Mobile Satellite Service (MSS), Fixed Satellite Service (FSS) or Inter-Satellite Service (ISS) to facilitate the accommodation of ISLs within existing frequency band allocations.[13] As space grows increasingly crowded, liberalizing the definition of satellite services could threaten to increase interference between services. To the extent ISLs are permitted to operate on additional frequency bands, operations should not be permitted until the proper study is undertaken at the ITU. Specific allocations of frequency bands for use as ISL are traditionally made by competent World Radiocommunication Conferences ("WRC") based on study contributions and analysis

[11] *Small Sat NPRM* ¶ 70.

[12] *Id.* ¶ 70 (noting that when FSS operations are limited by parenthetical to operations in a particular direction, such as space-to-Earth, inter-satellite communications are not in accordance with the Table of Allocations).

[13] *Id.* ¶ 72.

that guarantee the safe use of those frequency bands for such service.[14] The Commission should continue to follow this standard procedure to ensure that new frequency allocations are sufficiently studied before they can be changed in the United States.

IV. ECHOSTAR SUPPORTS THE COMMISSION'S PROPOSED STREAMLINED PROCESSING REQUIREMENTS

Application Requirements. EchoStar concurs with the Commission's proposal to require the small satellite applicant to file a Form 312 and a Schedule S along with certifications demonstrating the applicant's compliance with Part 25 rules instead of the full narrative that typically accompanies a satellite application.[15] The submission of a Schedule S will ensure that the applicant fully describes the satellite system, and provide the Commission and other satellite operators with the ability to fully review the proposed operations.

V. ANY ADOPTED APPLICATION AND REGULATORY FEE STRUCTURE FOR SMALL SATELLITES SHOULD REFLECT TRUE REGULATORY COSTS

The Commission seeks comment on the appropriate one-time application fee that should be assessed for the proposed streamlined small satellite applications.[16] EchoStar does not object to the Commission charging a lesser amount for a streamlined small satellite application. However, the fee selected must reflect the work that it will take the International Bureau staff to review each streamlined small satellite application, as required by statute.[17] Accordingly, once the fee is selected, the Commission should revisit it within a year to determine if it properly

[14] This includes the development of standards for antenna pointing accuracy, performance standards and interference avoidance.

[15] *Small Sat NPRM* ¶¶ 47-48.

[16] *Id.* ¶ 75-76.

[17] *See Repack Airwaves Yielding Better Access for Users of Modern Services Act of 2018*, H.R. Rep. No. 115-587, pt. 1, at 4-5.

reflects the costs of application review and processing. Based on this analysis, the Commission should revise the application fee appropriately.

VI. CONCLUSION

Based upon the foregoing, EchoStar supports the creation of streamlined rules for small satellites that will facilitate the deployment of small satellite constellations while preventing interference to GSO FSS operations. To that end, small satellite operations should be consistent with both ITU and the Commission's rules. EchoStar also urges the Commission to consider appropriate the adoption of sufficient orbital debris mitigation measures to ensure the protection of space operations. Finally, the Commission should ensure that the application fee is commensurate with the true cost of the streamlined application review.

Respectfully submitted,

ECHOSTAR SATELLITE OPERATING CORPORATION AND HUGHES NETWORK SYSTEMS, LLC

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